AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1   1. (Currently amended) A method for detecting violations of type casting
2   rules in a computer program, comprising:
3   receiving the computer program prior to compilation and execution,
4   wherein the computer program is received in source code form;
5   locating ~~the explicit~~ an explicit-type casting operation within the computer
6   program, wherein the explicit type casting operation involves a first pointer and a
7   second pointer;
8   checking the explicit type casting operation for a violation of a type
9   casting rule; and
10   if a violation is detected, indicating the type-casting violation.

1   2. (Previously presented) The method of claim 1, wherein checking the
2   explicit type casting operation involves determining if the first pointer is defined
3   to be a structure pointer and the second pointer is not defined to be a structure
4   pointer, and if so, indicating a violation if no char exception applies.

1   3. (Previously presented) The method of claim 2, wherein indicating the
2   type-casting violation involves:
3   generating a warning to warn a programmer of a potential type violation if
4   the second pointer is a void or char pointer; and
5   generating an error to indicate a type casting violation to the programmer
6   if the second pointer is a pointer to a scalar.

1   4. (Original) The method of claim 1, wherein if the first pointer is defined

2   to point to a first structure type and the second pointer is defined to point to a

3   second structure type, the method further comprises:

4   determining whether the first structure type and the second structure type

5   belong to the same alias group; and

6   if the first structure type and the second structure type do not belong to the

7   same alias group, generating an error to indicate a type violation.

1   5. (Original) The method of claim 4, wherein determining whether the first

2   structure type and the second structure type belong to the same alias group

3   involves:

4   keeping track of special program statements that link structure types into

5   alias groups;

6   determining that the first structure type and the second structure type

7   belong to the same alias group if the first structure type and the second structure

8   type are the same structure type, or if one or more special procedures link the first

9   structure type and the second structure type into the same alias group.

1   6. (Original) The method of claim 5, further comprising determining that

2   the first structure type and the second structure type belong to the same alias

3   group if the first structure type and the second structure type have all the same

4   basic types in the same order.

1   7 (Canceled).

1   8. (Original) The method of claim 1, further comprising:

2   receiving an identifier for a set of constraints on memory references that a

3   programmer has adhered to in writing the computer program; and

4   using the identifier to select a type casting rule from a set of type casting

5   rules, the selected type casting rule being associated with the set of constraints;

6   wherein each type casting rule in the set of type casting rules is associated

7   with a different set of constraints on memory references.

1   9. (Original) The method of claim 1, wherein the method is performed by a

2   compiler.

1   10. (Original) The method of claim 1, wherein the method is performed by

2   an error checking application, which is not part of a compiler.

1   11. (Currently amended) A computer-readable storage medium storing

2   instructions that when executed by a computer cause the computer to perform a

3   method for detecting violations of type casting rules in a computer program, the

4   method comprising:

5   receiving the computer program prior to compilation and execution,

6   wherein the computer program is received in source code form;

7   locating the explicit an explicit type casting operation within the computer

8   program, wherein the explicit type casting operation involves a first pointer and a

9   second pointer;

10   checking the explicit type casting operation for a violation of a type

11   casting rule; and

12   if a violation is detected, indicating the type-casting violation.

1   12. (Previously presented) The computer-readable storage medium of

2   claim 11, wherein checking the explicit type casting operation involves

3   determining if the first pointer is defined to be a structure pointer and the second

4   pointer is not defined to be a structure pointer, and if so, indicating a violation if

5   no char exception applies.

1   13. (Previously presented) The computer-readable storage medium of

2   claim 12, wherein indicating the type-casting violation involves:

3   generating a warning to warn a programmer of a potential type violation if

4   the second pointer is a void or char pointer; and

5   generating an error to indicate a type casting violation to the programmer

6   if the second pointer is a pointer to a scalar.

1   14. (Original) The computer-readable storage medium of claim 11,

2   wherein if the first pointer is defined to point to a first structure type and the

3   second pointer is defined to point to a second structure type, the method further

4   comprises:

5   determining whether the first structure type and the second structure type

6   belong to the same alias group; and

7   if the first structure type and the second structure type do not belong to the

8   same alias group, generating an error to indicate a type violation.

1   15. (Original) The computer-readable storage medium of claim 14,

2   wherein determining whether the first structure type and the second structure type

3   belong to the same alias group involves:

4   keeping track of special program statements that link structure types into

5   alias groups;

6   determining that the first structure type and the second structure type

7   belong to the same alias group if the first structure type and the second structure

8   type are the same structure type, or if one or more special procedures link the first

9   structure type and the second structure type into the same alias group.

1   16. (Original) The computer-readable storage medium of claim 15,

2 wherein the method further comprises determining that the first structure type and

3 the second structure type belong to the same alias group if the first structure type

4 and the second structure type have all the same basic types in the same order.

1   17 (Canceled).

1   18. (Original) The computer-readable storage medium of claim 11,

2 wherein the method further comprises:

3   receiving an identifier for a set of constraints on memory references that a

4 programmer has adhered to in writing the computer program; and

5   using the identifier to select a type casting rule from a set of type casting

6 rules, the selected type casting rule being associated with the set of constraints;

7   wherein each type casting rule in the set of type casting rules is associated

8 with a different set of constraints on memory references.

1   19. (Original) The computer-readable storage medium of claim 11,

2 wherein the method is performed by a compiler.

1   20. (Original) The computer-readable storage medium of claim 11,

2 wherein the method is performed by an error checking application, which is not

3 part of a compiler.

1   21. (Currently amended) An apparatus that detects violations of type

2 casting rules in a computer program, comprising:

3   a receiving mechanism that is configured to receive the computer program

4 prior to compilation and execution;

6

5   wherein the receiving mechanism is configured to receive the computer

6   program in source code form;

7   a locating mechanism that is configured to locate ~~the explicit~~ an explicit

8   type casting operation within the computer program, wherein the explicit type

9   casting operation involves a first pointer and a second pointer; and

10   a type rule checking mechanism that is configured check the explicit type

11   casting operation for a violation of a type casting rule, and if a violation is

12   detected, to indicate the type-casting violation.

1   22. (Previously presented) The apparatus of claim 21, wherein the type

2   rule checking mechanism is configured to determine if the first pointer is defined

3   to be a structure pointer and the second pointer is not defined to be a structure

4   pointer, and if so, to indicate a violation if no char exception applies.

1   23. (Previously presented) The apparatus of claim 22, wherein the type

2   casting rule checking mechanism is configured to:

3   generate a warning to warn a programmer of a potential type violation if

4   the second pointer is a void or char pointer; and to

5   generate an error to indicate a type-casting violation to the programmer if

6   the second pointer is a pointer to a scalar.

1   24. (Original) The apparatus of claim 21, wherein if the first pointer is

2   defined to point to a first structure type and the second pointer is defined to point

3   to a second structure type, the type rule checking mechanism is configured to:

4   determine whether the first structure type and the second structure type

5   belong to the same alias group; and to

6   generate an error to indicate a type violation if the first structure type and

7   the second structure type do not belong to the same alias group.

1   25. (Original) The apparatus of claim 24, wherein in determining whether

2 the first structure type and the second structure type belong to the same alias

3 group, the type rule checking mechanism is configured:

4   keep track of special program statements that link structure types into alias

5 groups; and to

6   determine that the first structure type and the second structure type belong

7 to the same alias group if the first structure type and the second structure type are

8 the same structure type, or if one or more special procedures link the first structure

9 type and the second structure type into the same alias group.

1   26. (Original) The apparatus of claim 25, wherein the type rule checking

2 mechanism is configured to determine that the first structure type and the second

3 structure type belong to the same alias group if the first structure type and the

4 second structure type have all the same basic types in the same order.

1   27 (Canceled).

1   28. (Original) The apparatus of claim 21, wherein the receiving

2 mechanism is configured to receive an identifier for a set of constraints on

3 memory references that a programmer has adhered to in writing the computer

4 program, and further comprising:

5   a selection mechanism that is configured to use the identifier to select a

6 type casting rule from a set of type casting rules, the selected type casting rule

7 being associated with the set of constraints;

8   wherein each type casting rule in the set of type casting rules is associated

9 with a different set of constraints on memory references.

1   29. (Original) The apparatus of claim 21, further comprising a compiler

2   that contains the receiving mechanism, the locating mechanism and the type rule

3   checking mechanism.

1   30. (Original) The apparatus of claim 21, further comprising an error

2   checking application, which is not part of a compiler;

3   wherein the error checking application contains the receiving mechanism,

4   the locating mechanism and the type rule checking mechanism.